Evaluation of Seven Processing Sweet Corn (*Zea mays*) Hybrids at Four Plant Populations in the Columbia Basin of Washington

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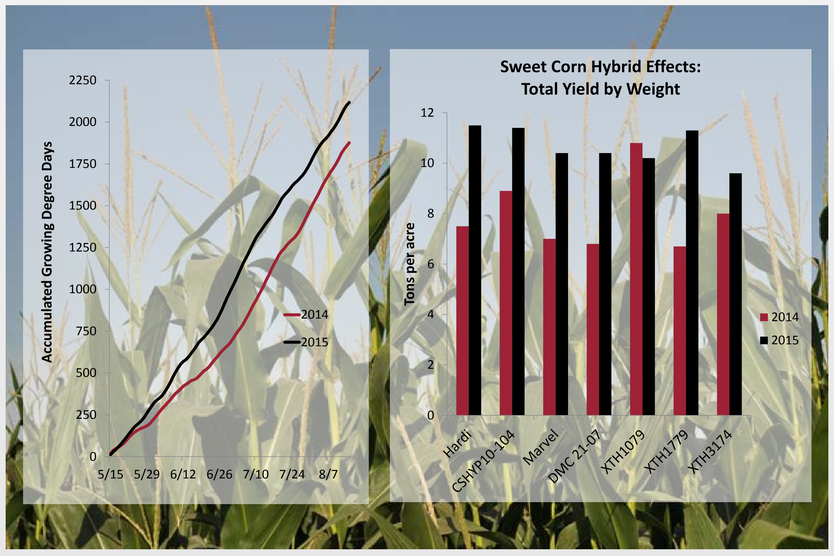
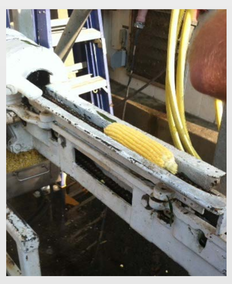
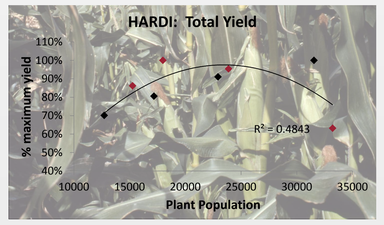
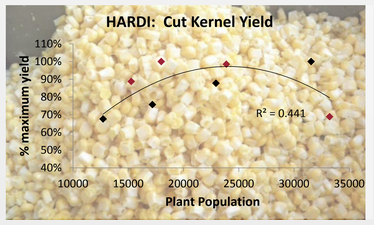
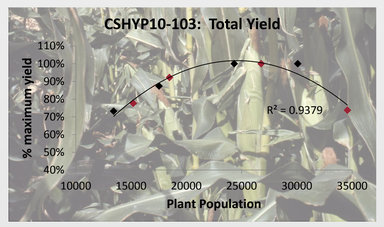
ABSTRACT A recent study from the Midwest demonstrated that plant populations for maximum sweet corn yield vary greatly for different hybrid varieties, and suggested that yields could increase by planting most of the newer hybrids at higher populations than are currently used. The study was conducted under a rain-fed system with lower yield potential compared to the Columbia Basin region in Washington where sweet corn is irrigated. In this trial, we evaluated the yield and processing qualities of seven sweet corn hybrids grown in the Columbia Basin at varying plant populations in 2014 and 2015. The seven hybrids were Hardi, CSHYP10-104, Marvel, DMC 21-07, XTH1079, XTH1779, and XTH3174. They were planted at four seeding rates: 19,000, 23,200, 29,900, and 41,800 seeds per acre using a Latin square design and four replications. The actual plant populations achieved in 2014 and 2015 differed; stands were about 80% and 70% of the seeded rate in 2014 and 2015 respectively. Plant growth differed greatly each year; the plants matured earlier, ears were larger, there were more ears per acre, and yields were higher in 2015 compared to 2014. In both years, total ear count and the primary ear count increased as plant population increased, while unhusked ear weights decreased. Larger ears compensated for fewer ears as the plant population increased so that yields were not significantly different at each plant population in 2014. In 2015, the larger ears at lower plant populations did not make up for having fewer ears and the total yield increased significantly with each increase in plant population. Processing quality assessments including, tip fill, ear weight, ear diameter, and the weight of kernels recovered per ear significantly decreased as plant population increased both years. The yields of kernels recovered on a per acre basis, however, is also influenced by the number of ears produced and so the results differed each year. There were significant hybrid x population responses in this study for secondary ear count and secondary ear yield, ear weight, and all processing recovery measurements. Quadratic response curves for yield and cut kernel yield have been assembled for each of the hybrids we evaluated. All of the hybrids should be evaluated again at higher populations to round out the curves (some of their responses are nearly linear with populations under 33,000 plants per acre) and to account for seasonal differences.

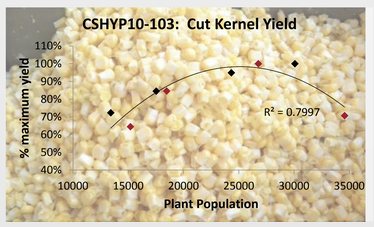


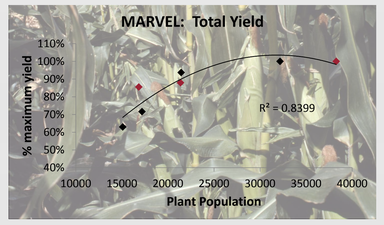


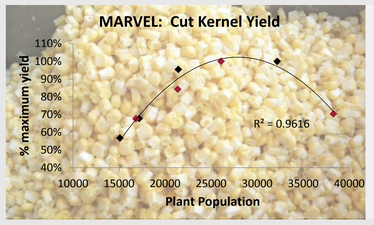


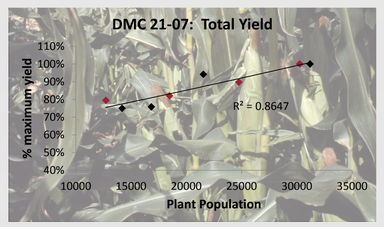


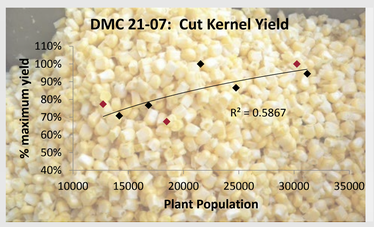


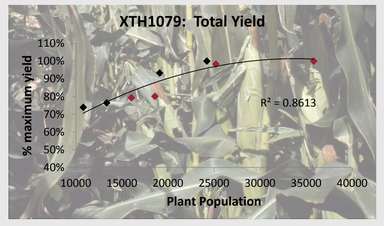


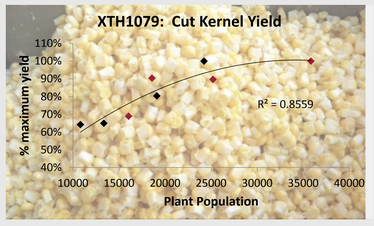


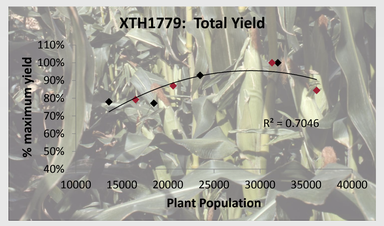


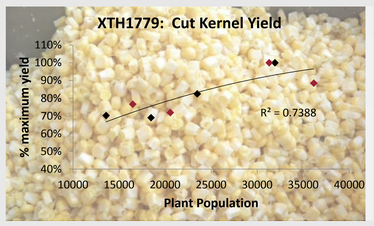


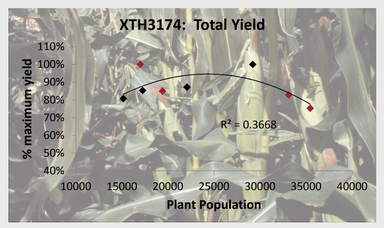


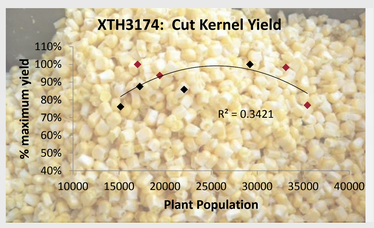












Ear Counts & Yield at Four Plant Populations in 2014

Seeding Rate	Plant Population	Green Ear Weight	Primary Ears Count & Yield		Secondary Ears Count & Yield		Total Ears Count & Yield	
Seeds/A	Plants/A	Lbs.	Ears/A	T/A	Ears/A	T/A	Ears/A	T/A
41,800	34,600 a	0.81 c	20,761 a	6.8	2,026	0.9	22,786 a	7.7
29,900	27,300 b	0.89 b	18,667 ab	7.5	1,881	0.8	20,547 ab	8.3
23,200	19,200 c	0.91 b	16,807 b	7.4	1,642	0.8	18,454 bc	8.1
19,000	15,800 d	0.97 a	13,824 c	6.6	2,335	1.1	16,159 c	7.6
	↑	↓	↑				↑	
HYBRID	*	*	*	*	*	*	*	*
POPULATION	*	*	*	NS	NS	NS	*	NS
HYBRID x POP	*	NS	*	*	NS	NS	*	*

Ear and Processing Qualities at Four Plant Populations in 2014

Plant Population	Tip Fill	Uniform	Ear Length	Ear Diameter	Trimmed Ear Weight	Cut Corn Yield (Kernel Recovery)		Recovery
Plants/A	(1-5)	(1-5)	(in)	(in)	(lb)	(lb/ear)	(lb/A)	(%)
34,800 a	3.1 c	3.8 c	8.14 c	1.88 c	0.64 c	0.39 c	8,795 b	48.6 b
27,300 b	3.6 b	4.0 b	8.50 b	1.95 b	0.71 b	0.45 b	10,532 a	50.9 a
19,200 c	3.8 ab	4.0 b	8.79 a	1.99 a	0.72 b	0.48 ab	9,580 ab	50.4 a
15,600 d	4.0 a	4.2 a	8.84 a	2.01 a	0.77 a	0.50 a	8,230 b	50.6 a
	↓	↓	↓	↓	↓	↓		
HYBRID	*	*	*	*	*	*	*	*
POPULATION	*	*	*	*	*	*	*	*
HYBRID x POP	NS	NS	NS	NS	NS	NS	*	NS

Ear Counts & Yield at Four Plant Populations in 2015

Seeding Rate	Plant Population	Green Ear Weight	Primary Ears Count & Yield		Secondary Ears Count & Yield		Total Ears Count & Yield	
Seeds/A	Plants/A	Lbs.	Ears/A	T/A	Ears/A	T/A	Ears/A	T/A
41,800	30,000 a	0.95 c	28,375 a	12.1 a	447 c	0.2 c	28,822 a	12.4 a
29,900	22,100 b	1.01 b	23,389 b	11.0 b	936 b	0.5 b	24,325 b	11.5 b
23,200	16,800 c	1.03 a	18,618 c	9.1 c	1,403 ab	0.7 ab	20,021 c	9.8 c
19,000	13,600 d	1.05 a	16,008 d	8.2 d	1,656 a	0.9 a	17,664 d	9.0 d
	↑	↓	↑	↑	↓	↓	↑	↑
HYBRID	*	*	*	*	*	*	*	*
POPULATION	*	*	*	*	*	*	*	*
HYBRID x POP	NS	*	NS	NS	*	*	NS	NS

Ear and Processing Qualities at Four Plant Populations in 2015

Plant Population	Tip Fill	Uniform	Ear Length	Ear Diameter	Trimmed Ear Weight	Cut Corn Yield (Kernel Recovery)		Recovery
Plants/A	(1-5)	(1-5)	(in)	(in)	(lb)	(lb/ear)	(lb/A)	(%)
30,000 a	3.5 c	3.9	8.50	1.95 b	0.76 b	0.42 c	11,892 a	43.6
22,100 b	3.8 bc	4.0	8.58	1.97 ab	0.78 b	0.44 b	10,599 b	43.6
16,800 c	4.1 a	4.1	8.48	1.99 a	0.81 a	0.45 ab	9,013 c	43.7
13,600 d	4.0 ab	4.0	8.51	1.99 a	0.81 a	0.46 a	8,109 c	43.9
	↓			↓	↓	↓	↑	
HYBRID	*	*	*	*	*	*	*	*
POPULATION	*	NS	NS	*	*	*	*	NS
HYBRID x POP	NS	NS	NS	NS	*	*	*	*

Main effects were analyzed using ANOVA. Significant effects are denoted by (*) and those that were not significant with (NS). Data presented in the tables are the means for nine hybrids averaged across each seeding rate treatment. Results in columns followed by the same letter are not significantly different based on protected Fisher's LSD. (P=0.05).

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